

Rapid Watershed Assessment

Lower Rainy

(MN) HUC: 09030008



DRAFT

Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help land-owners and local leaders set priorities and determine the best actions to achieve their goals.

Introduction

The Lower Rainy 8-digit Hydrological Unit Code (HUC) Subbasin lies on the United States-Canadian border, and is situated in the Laurentian Mixed Forest Ecological Province of Northern Minnesota. This watershed is 195,153 acres in size. Approximately 44 percent of the land in the subbasin is held by private landowners.

There are an estimated 45 Farms in the Watershed. Approximately 37 percent of the operations are less than 180 acres in size, 48 percent are 180 to 1,000 acres in size, and the remaining 10 percent of farms are greater than 1,000 acres in size.

The main resource concerns in the watershed are soil erosion, management of excessive wetness, wetland and woodland management, and the short growing season. Additional concerns include pasture management and surface water quality.

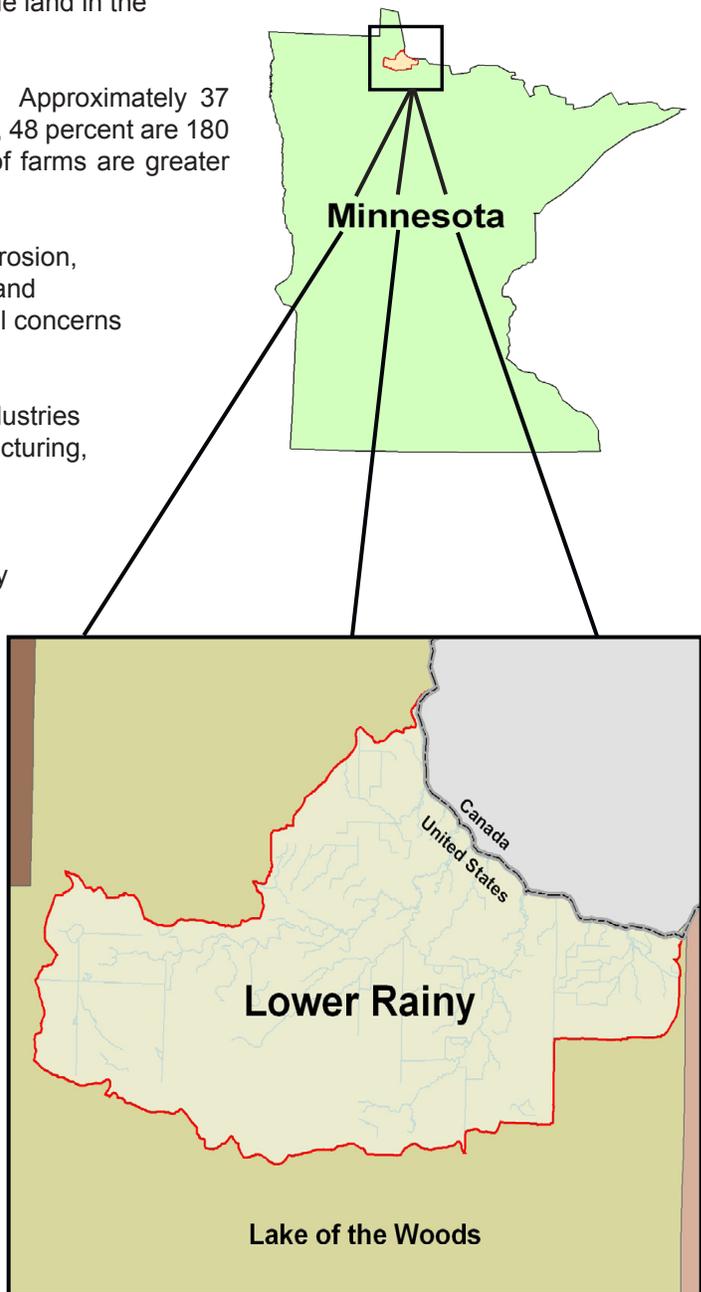
As with many areas of Northern Minnesota, principal industries include forest product harvesting, forest product manufacturing, farming and tourism.

The Lower Rainy watershed is the smallest subbasin of the Rainy Lake Basin. Like its neighbors, Lower Rainy is characterized by extensive wetlands located on the Glacial Lake Agassiz lake bed.

The greater Rainy River Basin is home to some of Minnesota's finest forest and water resources. Voyageurs National Park and the Boundary Waters Canoe Area Wilderness (BWCA) are located within the Basin, as are several of the state's most famous walleye fisheries and many top-notch trout streams.

County Totals

County	Acres in HUC	% HUC
Lake of the Woods	195,153	100.0%
Total acres:	195,153	100%



Physical Description

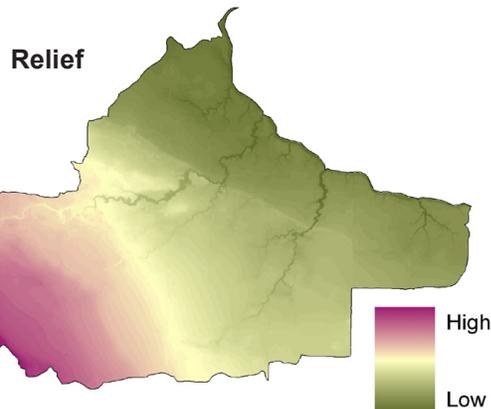
This once glaciated area is part of the Agassiz Lowlands Region. Soils in this HUC are generally sandy loams, with considerable deposits of glacial till and outwash over a bedrock residuum.

Average elevation in the watershed is 1136 feet above sea level, with the highest values being in the Western and Southwestern portions of the watershed. Lower elevations are found across the Eastern and Northern portions dominated by peatlands and open water.

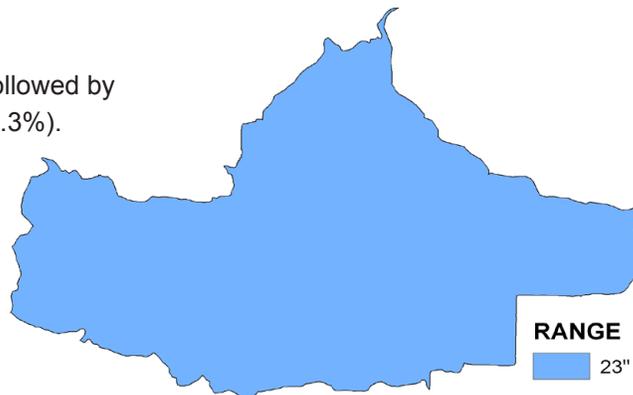
Precipitation in the watershed averages 23 inches annually. Most land within this watershed is not considered highly erodible, and the soils are predominantly hydric. Much of the land in the subbasin is not suited or is poorly suited to agricultural uses.

Predominate land uses / land covers are wetlands (48%), followed by forest (32%), Grass / Pasture /Hay (9%), and Row Crops (7.3%).

Development pressure is moderate throughout this subbasin, with occasional lands being parceled out for timber production or recreational use.

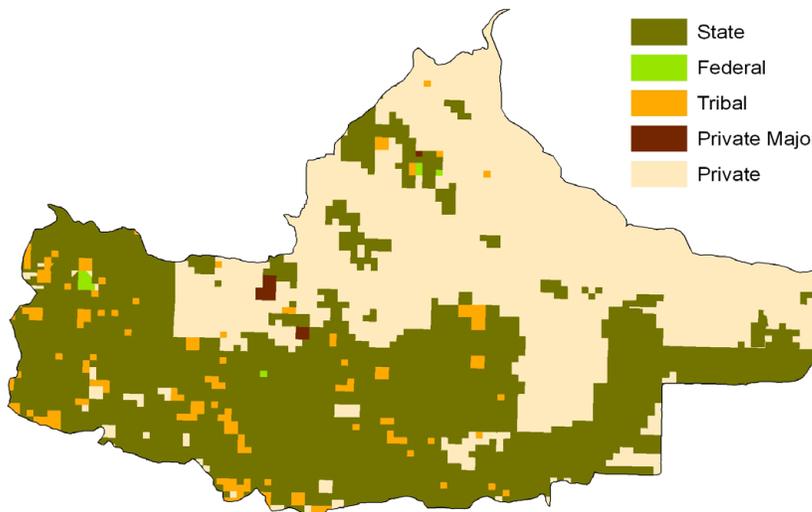


Average Precipitation (inches)



Ownership

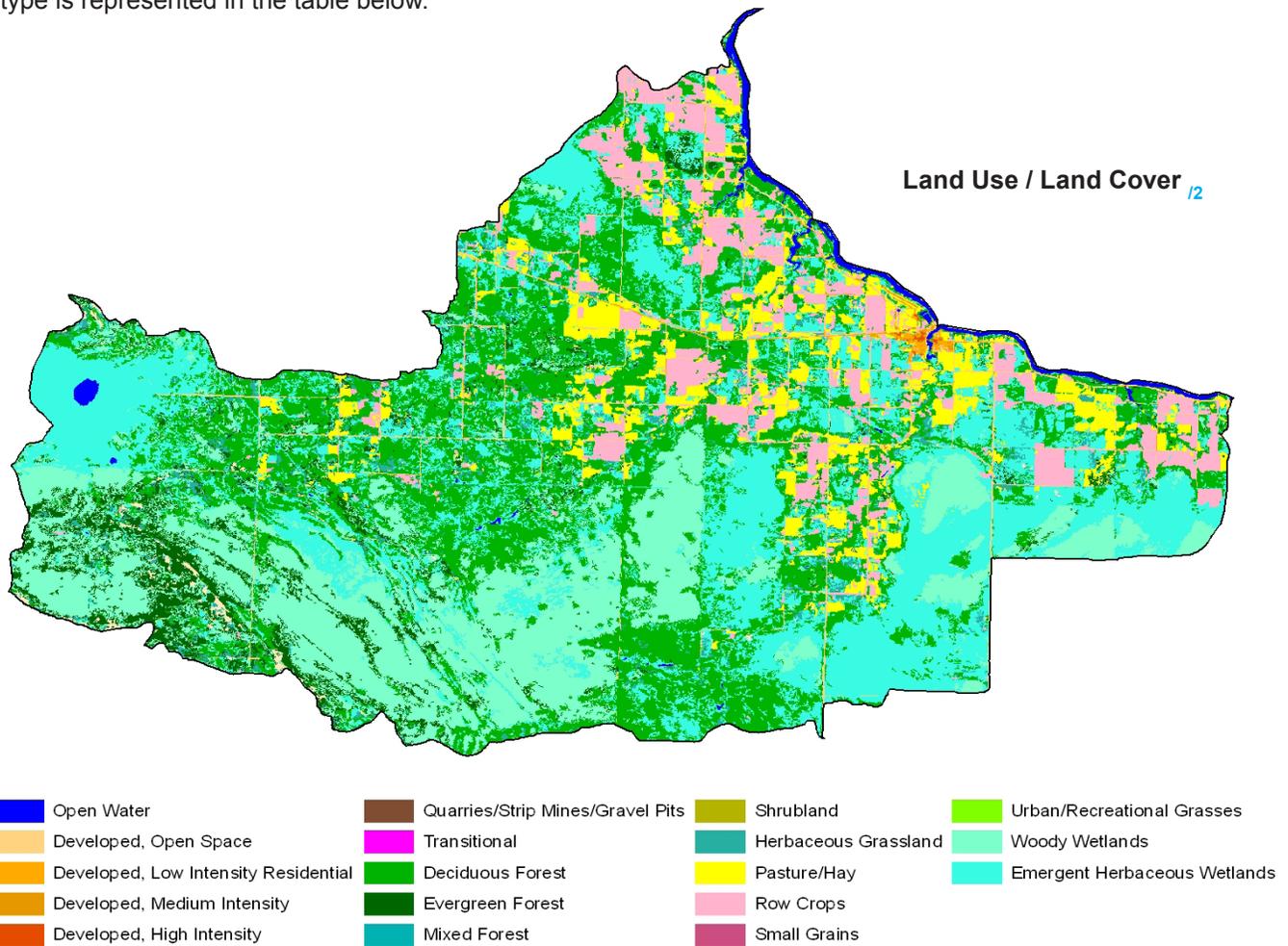
Ownership Type	Acres	%HUC
Conservancy	-	-
County	-	-
Federal	400	0.2
State	101,409	52.0
Other Public	-	-
Tribal	6,495	3.3
Private Major	595	0.3
Private	86,255	44.2
Total Acres:	195,153	100



* Ownership totals derived from 2007 MN DNR GAP Stewardship Coverage data and are the best suited estimation of land stewardship available on a statewide scale at time of publication. See the bibliography section of this document for further information.

Ownership / Land Use

The Lower Rainy Watershed covers an area of 195,153 acres. Fifty two percent of the land in the watershed is owned or managed by state entities (101,409 acres). The second largest ownership type is Private, with 86,255 acres (44.2%), followed by Tribal with approximately 6,495 acres (3.3%), and Private Major (Corporate) with 595 acres (0.3%). Federal lands account for the smallest ownership percentage, covering 400 acres (0.2%). Data indicates no major county or conservancy land holdings in the region. Land use by ownership type is represented in the table below.



Ownership / Land Use

Landcover/Use	Public		Private**		Tribal		Total Acres	Percent
	Acres	% Public	Acres	% Private	Acres	% Tribal		
Forest	31,088	15.9%	29,381	15.1%	2,152	1.1%	62,621	32.1%
Grass, etc	1,315	0.7%	15,934	8.2%	125	0.1%	17,373	8.9%
Orchards	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Row Crops	122	0.1%	14,166	7.3%	14	0.0%	14,303	7.3%
Shrub etc	502	0.3%	344	0.2%	67	0.0%	913	0.5%
Wetlands	67,942	34.8%	21,618	11.1%	4,094	2.1%	93,654	48.0%
Residential/Commercial	485	0.2%	3,768	1.9%	25	0.0%	4,279	2.2%
Open Water*	285	0.1%	1,606	0.8%	8	0.0%	1,899	1.0%

* ownership undetermined

** includes private-major

Watershed Totals:	101,741	52.16%	86,817	44.5%	6,484	3.3%	195,153	100%
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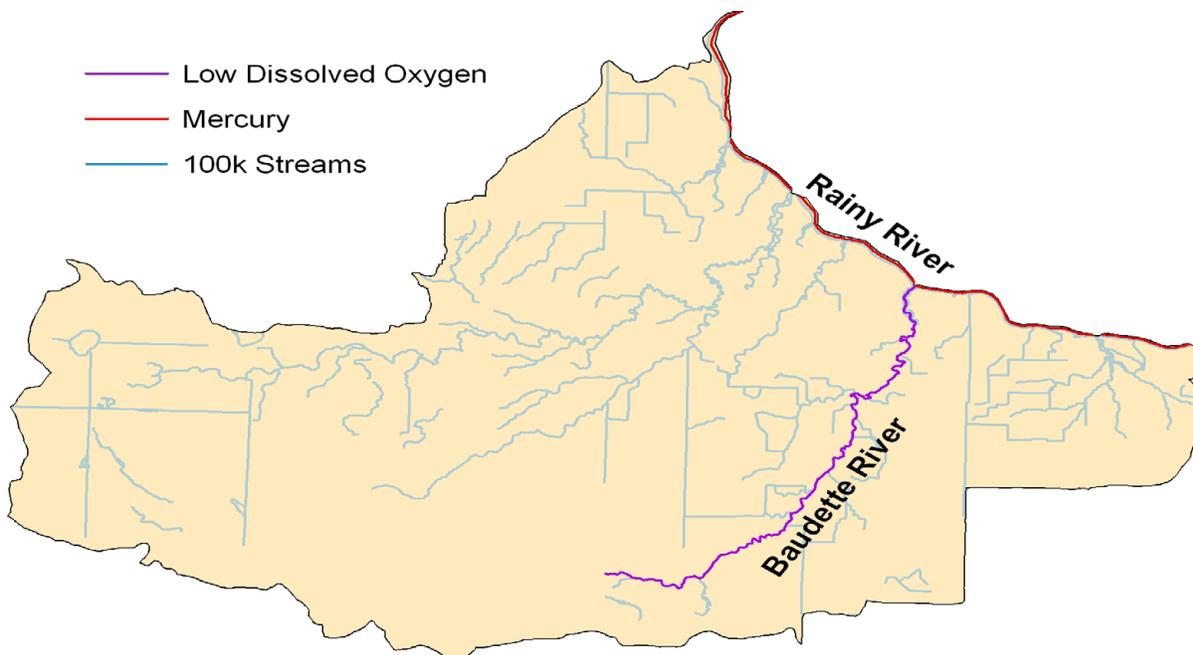
Physical Description (continued)

		cu. ft/sec		
Stream Flow Data	USGS Stream Flow Data Not Available at HUC8 level at time of publication	Total Avg.	-N/A-	
		May – Sept. Yield	-N/A-	
Stream Data¹⁴ (*Percent of Total HUC Stream Miles)		Miles	Percent	
	Total Miles – Major (100K Hydro GIS Layer)	317	---	
	Total Miles –303d (TMDL Listed Streams)	35.8	11%*	
Riparian Land Cover/Land Use¹⁵ (Based on a 100-foot buffer on both sides of all streams in the 100K Hydro GIS Layer)	Land Use Type	Acres	Percent	
	Forest	3,321	43.5%	
	Grain Crops	0	0.0%	
	Grass, etc	840	11.0%	
	Orchards	0	0.0%	
	Row Crops	642	8.4%	
	Shrub etc	20	0.3%	
	Wetlands	2,070	27.1%	
	Residential/Commercial	291	3.8%	
	Open Water	444	5.8%	
	Total Buffer Acres:	7,629	100%	
	Crop and Pastureland Land Capability Class¹⁶ (Croplands & Pasturelands Only) (1997 NRI Estimates for Non-Federal Lands Only)	1 – slight limitations	0	0%
2 – moderate limitations		36,200	63%	
3 – severe limitations		10,700	19%	
4 – very severe limitations		10,800	19%	
5 – no erosion hazard, but other limitations		0	0%	
6 – severe limitations; unsuitable for cultivation; limited to pasture, range, forest		0	0%	
7 – very severe limitations; unsuitable for cultivation; limited to grazing, forest, wildlife habitat		0	0%	
8 – miscellaneous areas; limited to recreation, wildlife habitat, water supply		0	0%	
Total		57,700	-	
Irrigated Lands¹⁷ (1997 NRI Estimates for Non-Federal Lands Only)		TYPE OF LAND	ACRES	% of Irrigated Lands
	Cultivated Cropland	0	0%	0%
	Uncultivated Cropland	0	0%	0%
	Pastureland	0	0%	0%
	Total Irrigated Lands	0	0%	0%

Assessment of Waters 18

Section 303(d) of the Clean Water Act states that water bodies with impaired use(s) must be placed on a state’s impaired waters list. A water body is “Impaired” or polluted when it fails to meet one or more of the Federal Clean Water Act’s water quality standards. Federal Standards exist for basic pollutants such as sediment, bacteria, nutrients, and mercury. The Clean Water Act requires the Minnesota Pollution Control Agency (MPCA) to identify and restore impaired waters.

Minnesota’s impaired waters list, updated every two years, identifies assessed waters that do not meet water quality standards. The primary tool for addressing impaired waters is a pollution reduction plan called a Total Maximum Daily Load, or TMDL. After impaired use(s) have been identified, the TMDL process identifies all sources of each pollutant. The plan then determines how much each source must reduce its contribution in order to meet the applicable water quality standard. The Clean Water Act requires a completed TMDL for each water quality violation identified on a state’s impaired waters list. Lakes or river reaches with multiple impairments require multiple TMDLs.



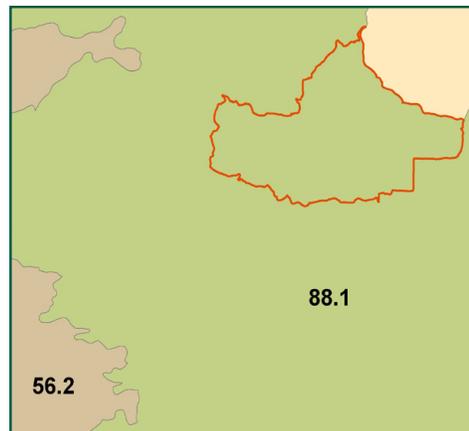
2006 MPCA 303D Listed Waterbody	Impairment	Affected Use
Rainy River Winter Road R to Lake of the Woods	Mercury	Aquatic Consumption
Rainy River Baudette R to RR Bridge in Baudette	Mercury	Aquatic Consumption
Rainy River RR Bridge in Baudette to Winter Rd R	Mercury	Aquatic Consumption
Baudette River Headwaters to Rainy R	Low Dissolved Oxygen	Aquatic Life
Rainy River Rapid R to Baudette R	Mercury	Aquatic Consumption

Common Resource Areas

The Lower Rainy Watershed is situated in a single Common Resource Area, CRA 88.1 ¹⁹

CRA 88.1 - Northern Minnesota Glacial Lake Basins:

Nearly level to gently sloping areas formed in lake washed till, lacustrine and organic soil material. Generally the soils are silty, clayey and loamy with small amounts of sandy and gravelly soils on beach ridges. Timber land is the main use. Scattered cropland and grazing land for beef and dairy are present. Cropland is used mostly for small grain, silage and hay. Resource concerns include management of excessive wetness, short growing season, pasture management, and water quality.



Only the major CRA units are described above.

 For further information, go to:

<http://soils.usda.gov/survey/geography/cra.html>

Soils / Geology ¹⁰

Soils in the watershed generally consist of loamy sands, with underlying bedrock a major characteristic in the Northeast portion. The soils are derived from a mantle of acid, cobbly, and gravelly glacial till of variable depth. Coarse-loamy to coarse soil textures are most common. There are small areas of sandy and clayey lacustrine soil in the western portion of the subsection.

Given the moisture regime of the region, soils are generally representative of wet forest soils known as Aqualfs, a sub order of the Alfisols found in Minnesota. Because of their position on the landscape, these soils are wet during much of the growing season. In northern Minnesota aqualfs support aspen forests with mixtures of black ash and alder. They are most common in the basins of glacial lakes that formed in the latter part of the Ice Age. The aqualfs that extend across the northern border of Minnesota lie in the basin of glacial Lake Agassiz.

Thin glacial drift covers much of the subsection, and bedrock exposures are common.

The subsection has Precambrian-age (Late Archean and Early Proterozoic) bedrock, including gneiss, undifferentiated granite, and metamorphosed mafic to intermediate volcanic and sedimentary rocks (Sims et al. 1970c, Morey 1976).

Visit the online Web Soil Survey at

<http://websoilsurvey.nrcs.usda.gov> for official and

 current USDA soil information as viewable maps and

 tables. Visit the Soil Data Mart at

<http://soildatamart.usda.gov> to download SSURGO

 certified soil tabular and spatial data.

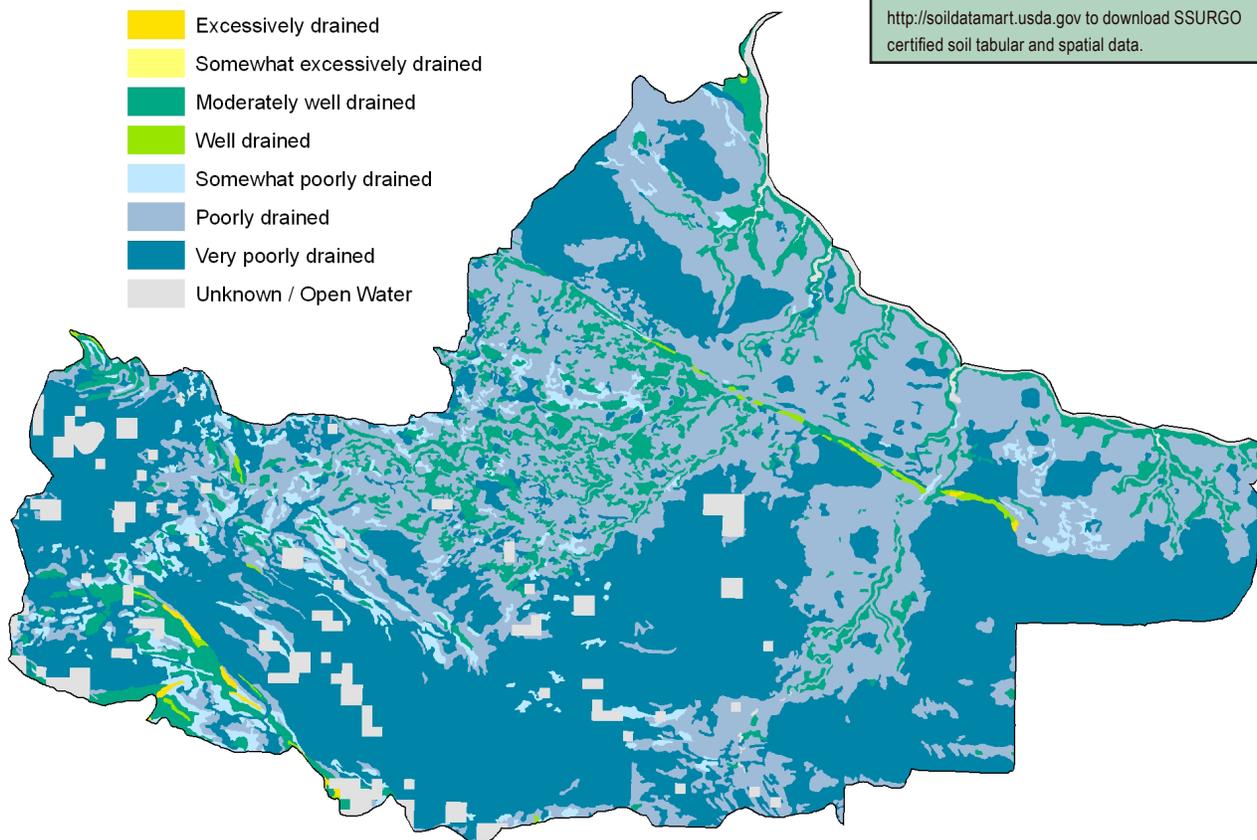
Drainage Classification

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil.

Seven classes of natural soil drainage are recognized—excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the “Soil Survey Manual.”



-  Excessively drained
-  Somewhat excessively drained
-  Moderately well drained
-  Well drained
-  Somewhat poorly drained
-  Poorly drained
-  Very poorly drained
-  Unknown / Open Water



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Farmland Classification

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland.

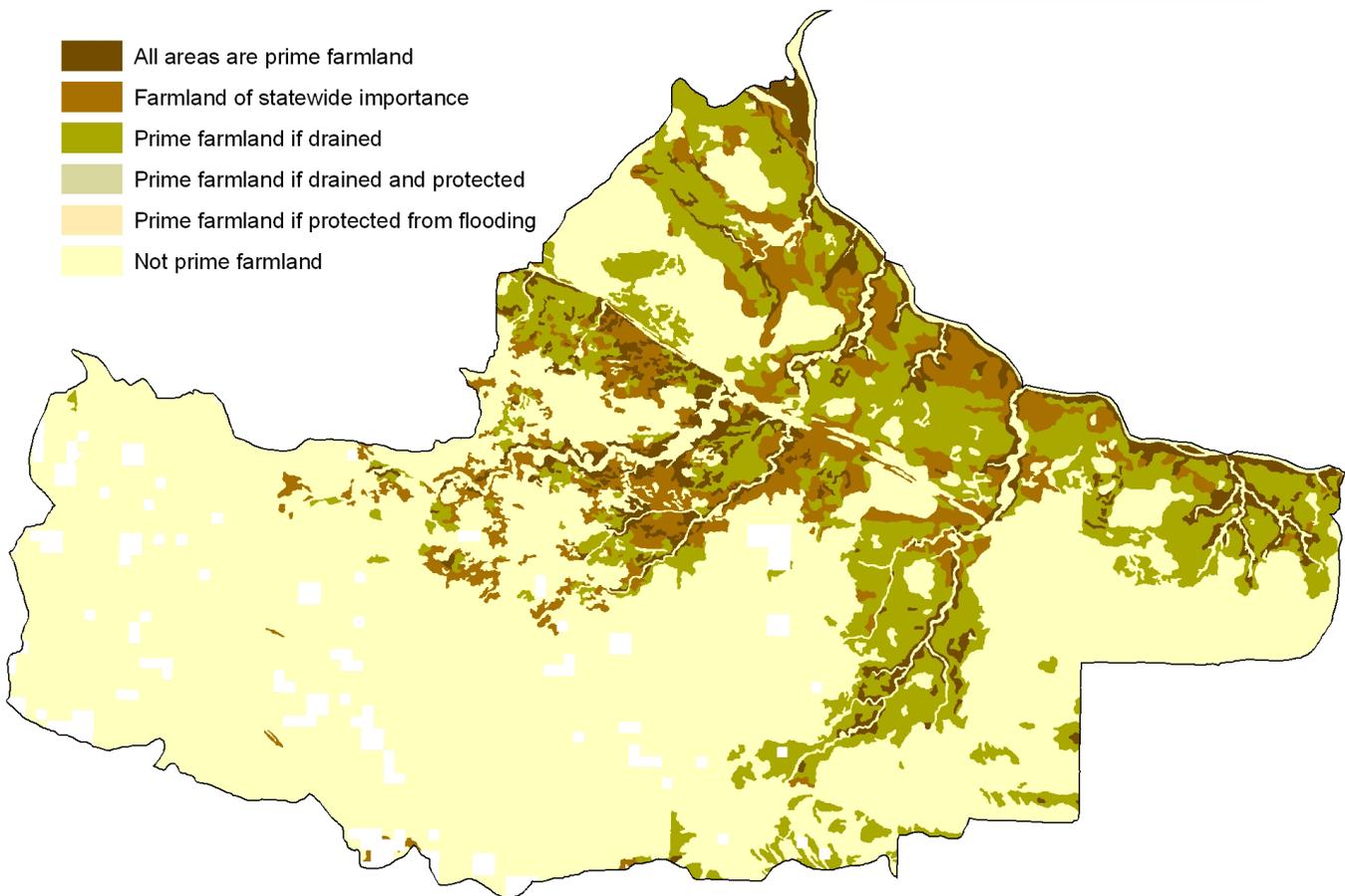
Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops.

NRCS policy and procedures on prime and unique farmlands are published in the Federal Register, Vol. 43, No 21, January 31, 1978.



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-  All areas are prime farmland
-  Farmland of statewide importance
-  Prime farmland if drained
-  Prime farmland if drained and protected
-  Prime farmland if protected from flooding
-  Not prime farmland



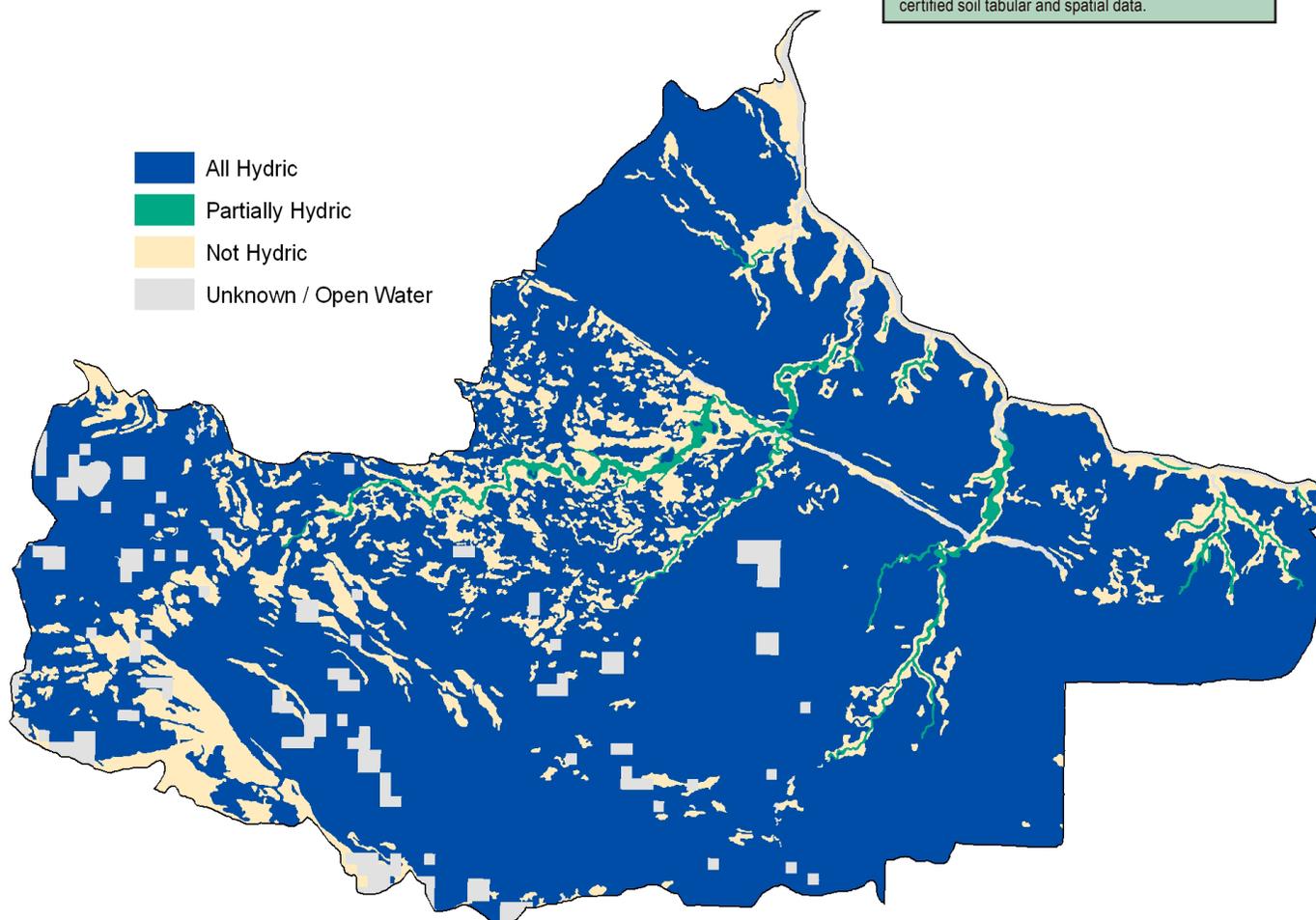
Hydric Soils

This rating provides an indication of the proportion of the map unit that meets criteria for hydric soils. Map units that are dominantly made up of hydric soils may have small areas, or inclusions of nonhydric soils in the higher positions on the landform. Map units of dominantly non-hydric soils may therefore have inclusions of hydric soils in the lower positions on the landform.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as “soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part” (Federal Register 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.



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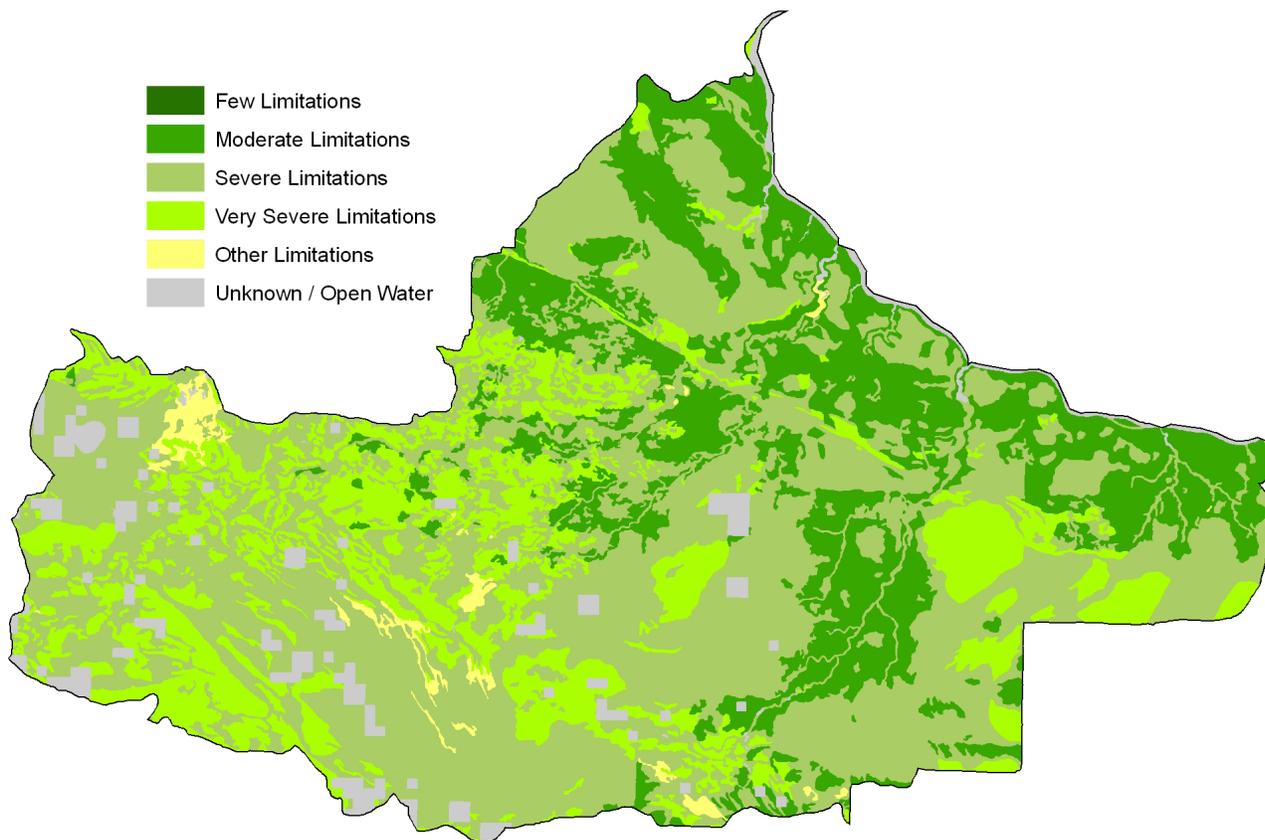
Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management.

The criteria used in grouping the soils does not include major and generally expensive land forming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.



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Performance Results System Data

Watershed Name: Lower Rainy				Watershed Number: 09030008						
PRS Performance Measures	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	TOTAL
Total Conservation Systems Planned (acres)	0	0	0	709	882	N/A	1,130	1,617	619	4,957
Total Conservation Systems Applied (acres)	0	0	0	110	110	N/A	135	884	912	2,151
Conservation Practices										
Total Waste Management (313) (numbers)	0	0	0	0	0	0	0	0	0	0
Riparian Forest Buffers (391) (acres)	0	0	0	0	18	0	35	88	0	141
Erosion Control Total Soil Saved (tons/year)	0	0	0	2,073	0	N/A	N/A	N/A	N/A	2,073
Total Nutrient Management (590) (Acres)	0	0	0	88	0	0	0	0	0	88
Pest Management Systems Applied (595A) (Acres)	0	0	0	0	0	0	0	0	0	0
Prescribed Grazing 528a (acres)	0	0	0	0	0	0	0	0	0	0
Tree & Shrub Establishment (612) (acres)	0	0	0	21	18	0	10	144	0	193
Residue Management (329A-C) (acres)	0	0	0	0	0	0	0	204	192	396
Total Wildlife Habitat (644 - 645) (acres)	0	0	0	110	18	0	110	119	48	405
Total Wetlands Created, Restored, or Enhanced (acres)	0	0	0	5	0	0	0	22	0	27
Acres enrolled in Farmbill Programs										
Conservation Reserve Program	0	0	0	110	18	N/A	49	72	0	249
Wetlands Reserve Program	0	0	0	0	0	N/A	0	0	0	0
Environmental Quality Incentives Program	0	0	0	0	250	N/A	71	684	634	1,639
Wildlife Habitat Incentive Program	0	0	0	0	0	N/A	0	0	278	278
Farmland Protection Program	0	0	0	0	0	N/A	0	0	0	0

THREATENED AND ENDANGERED SPECIES /14

NRCS assists in the conservation of threatened and endangered species and avoids or prevents activities detrimental to such species.

NRCS' concern for these species includes the species listed by the Secretary of the Interior (as published in the Federal Register) and species designated by state agencies.

The following is a list of threatened, endangered, candidate species and species of special concern that occur in the basin.



Scientific Name	Common Name	Type
<i>Asio flammeus</i>	Short-eared Owl	Zoological
<i>Acipenser fulvescens</i>	Lake Sturgeon	Zoological
<i>Cladium mariscoides</i>	Twig-rush	Botanical
<i>Coturnicops noveboracensis</i>	Yellow Rail	Zoological
<i>Cypripedium arietinum</i>	Ram's-head Lady's-slipper	Botanical
<i>Drosera anglica</i>	English Sundew	Botanical
<i>Haliaeetus leucocephalus</i>	Bald Eagle	Zoological
<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	Zoological
<i>Juncus stygius</i> var. <i>americanus</i>	Bog Rush	Botanical
<i>Malaxis monophyllos</i> var. <i>brachypoda</i>	White Adder's-mouth	Botanical
<i>Nymphaea leibergii</i>	Small White Water-lily	Botanical

RESOURCE CONCERNS

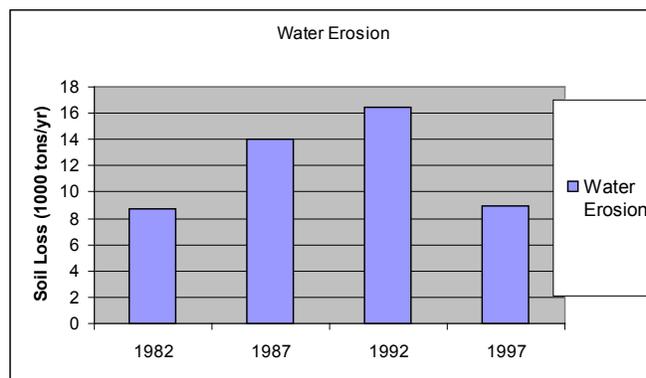
County Soil and Water Conservation Districts have identified the following resource concerns as top priorities for conservation and cost sharing efforts:

- Soil Quality, Excessive Erosion.** Soil erosion from exposed surface areas, logging sites, streambank and lakeshore areas, and roadside erosion are considerable conservation issues in the watershed.
- Management of Excessive Wetness:** The nature of much of the basin's soils limits productivity and viability of land for agricultural and some silvicultural uses. Efforts such as ditching, species selection, critical planting, and wetland mitigation aid in combating the wetness common to the area.
- Surface Water Quality:** Enhancement of surface waters. Excessive amounts of sediments, nutrients, and bacteria degrade the water quality causing a fish community with depressed populations and limited diversity. Reduction of priority pollutants and sediments in surface waters will enhance economic development opportunities by preserving the environmental features that promote and attract tourists and fishermen to the area and improve the quality of water supply in the region.
- Wetland Management.** Physical changes have taken place, wildlife and plant species composition have been altered, greatly changing the function and value of the areas plentiful wetlands. Establishing high priority wetland areas and enforcing future wetlands legislation provides opportunities to enhance the wetland resources of the watershed.
- Short Growing Season:** Given the short growing season, timely planting, management of moisture, and appropriate seed selection is crucial for a successful crop. Planting delay and short-time concentrated precipitation in the growth season are the main causes of yield reduction.
- Woodland Management.** Management opportunities include planting trees or shrubs, timber stand improvement, timber sales, enhancing wildlife habitat, prescribed burning, control of invasive species, and other conservation measures.



NRI Erosion Estimates

- NRI Estimates for Sheet and rill erosion by water on crop and pastureland increased by 300 tons a year over the 1982 to 1997 reporting period. ¹³



Socioeconomic and Agricultural Data (Relevant)

The Lower Rainy subbasin has an estimated population of 1,284 people. Median household income throughout the district is \$32,560 yearly, roughly 70% of the national average. Unemployment in the watershed is estimated at 4.7%, and approximately 10% of the residents in the watershed live below the national poverty level.



There are 45 Farms in the Rapid River Watershed. Approximately 37 percent of the operations are less than 180 acres in size, 48 percent are 180 to 1,000 acres in size, and the remaining farms are greater than 1,000 acres in size. Average farm size is 98 acres. Of the 44 operators in the basin, 50 percent are full-time producers not reliant on off farm income.

(MN) HUC# 9030008		Total Acres:	195,153
Population Data*	Watershed Population	1,284	
	Unemployment Rate	4.7%	
	Median Household Income	32,555	
	% below poverty level	10%	
	Median Value of Home	62,700	
Farm Data	# of Farms	45	
	# of Operators	44	Percent
	# of Full Time Operators	22	50%
	# of Part Time Operators	22	50%
	Total Cropland Acres	17,686	9.1%
Farm Size	1 to 49 Acres	6	12%
	50 to 179 Acres	11	25%
	180 to 499 Acres	16	35%
	500 to 999 Acres	6	13%
	1,000 Acres or more	7	15%
	Average Farm Size	98	
Livestock & Poultry	Cattle - Beef	366	34%
	Cattle - Dairy	16	1%
	Chicken	120	11%
	Swine	0	0%
	Turkey	0	0%
	Other	575	53%
	Animal Count Total:	1,077	
	Total Permitted AFOs:	9	
Chemicals (Acres Applied)	Insecticides	1,226	
	Herbicides	4,000	
	Wormicides	0	
	Fruiticides	0	
	Total Acres Treated	5,226	
	% State Chemical Totals	0.0%	

* Adjusted by percent of HUC in the county or by percent of block group area in the HUC, depending on the level of data available

Watershed Projects, Plans and Monitoring

- Long-term water quality monitoring in the Rainy River Watershed. The Northeast Region Sustainable Development Partnership joined with the Minnesota DNR and seven partners in both Canada and the United States to support water quality monitoring and environmental education involving an interagency, inter-scholastic and international cooperation. Koochiching County Environmental Services is the project coordinator. The sponsoring entity was the Rainy / Rapid River Board



- Local River Planning, MN DNR. This project assisted local units of government in the wise management of rivers within their jurisdiction. Collaborative teams created river plans -- consisting of land use zoning criteria, recreational objectives, water quality considerations, and historic/cultural recommendations for the St. Louis, Cloquet, Whiteface, Rainy, and Rapid rivers. These locally designed plans all contain more restrictive zoning provisions than the statewide standards and are tailored to specific local needs and concerns.

- Rainy River First Nations Watershed Program, Rainy River First Nations. A comprehensive ecosystem approach that considers all threats to the watershed. The effort is committed to using traditional ecological knowledge and values in combination with current natural resource management techniques to enhance and sustain aquatic resources in the Rainy River and its tributaries.

- Rainy / Rapid River Plan, MPCA and International Joint Commission. Goals may include delineation of specific stream segments to be restored or protected, loading reductions to be achieved, type and amount of habitat to be restored, identification of water management issues and problems, conservation district goals, priority issues and waters, and coordination of citizen monitoring programs and efforts.

* Have a watershed project you'd like to see included? Submit suggestions online @ <http://www.mn.nrcs.usda.gov/technical/rwa/>

Conservation Districts, Organizations & Partners

- **BWSR Regional Office**
394 S Lake Ave Rm 403 Duluth, MN 55802
Phone 218-723-4752
- **MPCA Regional Office - Duluth**
525 Lake Avenue S. # 400 Duluth, MN 55802
Phone 218-723-4660 or 800-657-3864
- **International Joint Commission Great Lakes Office**
100 Ouellette Ave., 8th Floor Windsor, ON N9A 6T3
Phone: 519-257-6733
- **MN DNR Area Hydrologist**
1201 E. Hwy. 2 Grand Rapids, MN 55744
Phone 218-327-4263
- **Lake of the Woods SWCD**
PO Box 217 Baudette, MN 56623
Phone 218-634-1842
- **U of MN Extension Service Regional Office**
1307 3rd St. NE, Suite 102 Roseau, MN 56751
Phone 218-463-0291 or 888-241-4546
- **Lake of the Woods Land and Water Planning**
Box 808 Baudette, MN 56623
Phone 218-634-1945
- **Rainy River First Nations**
Box 450 Emo, ON P0W 1E0
Phone 807-482-2479 Fax: (807) 482-2603
- **Laurentian Resource Conservation and Development Council**
4850 Miller Trunk Hwy, Suite 2A Duluth, MN 55811
Phone (218) 720-5225
- **Rainy River Basin Water Resources Center**
Rainy River Community College
1501 Highway 71 International Falls, MN 56649
Phone 218-285-2218

Footnotes / Bibliography

1. Ownership Layer – Source: MN Stewardship Data: Minnesota Department of Natural Resources, Section of Wildlife, BRW, Inc, 2007. This is the complete GAP Stewardship database containing land ownership information for the entire state of Minnesota. Date of source material is variable and ranges from 1976 to 2007, although a date range of 1983 to 1985 predominates. Land interest is expressed only when some organization owns or administers more than 50% of a forty except where DNR could create sub-forty accuracy polygons.
2. National Land Cover Dataset (NLCD) - Originator: U.S. Geological Survey (USGS); Publication date: 19990631; Title: Minnesota Land Cover Data Set, Edition: 1; Geospatial data presentation form: Raster digital data; Publisher: U.S. Geological Survey, Sioux Falls, SD, USA.
3. Ownership layer classes grouped to calculate Public ownership vs. Private and Tribal ownership by Minnesota NRCS Rapid Watershed Assessment Staff. Land cover / Land use data was then extracted from the National Landcover Dataset Classification System and related to ownership class polygons.
4. U.S. Geological Survey National Hydrography Dataset (NHD) 1:100,000-scale Digital Line Graph (DLG) medium resolution hydrography data, integrated with reach-related information from the U.S. Environmental Protection Agency Reach File Version 3.0 (RF3). The Hydro 100k layer was compared to MPCA's 303(d) data to derive percentage of listed waters.
5. Land Cover / Land Use / Hydro 100k Buffer. Using the 100k Hydrology dataset, All streams within HUC were spatially buffered to a distance of 100 ft. National Landcover Dataset attributes were extracted for the spatial buffer to demonstrate the vegetation and landuse in vulnerable areas adjacent to waterways.
6. Land Capability Class. ESTIMATES FROM THE 1997 NRI DATABASE (REVISED DECEMBER 2000) REPLACE ALL PREVIOUS REPORTS AND ESTIMATES. Comparisons made using data published for the 1982, 1987, or 1992 NRI may produce erroneous results. This is because of changes in statistical estimation protocols and because all data collected prior to 1997 were simultaneously reviewed (edited) as 1997 NRI data were collected. All definitions are available in the glossary. In addition, this December 2000 revision of the 1997 NRI data updates information released in December 1999 and corrects a computer error discovered in March 2000. For more information: <http://www.nrcs.usda.gov/technical/NRI/>
7. 1997 NRI Irrigated Land Estimates. Irrigated land: Land that shows evidence of being irrigated during the year of the inventory or during two or more years out of the last four years. Water is supplied to crops by ditches, pipes, or other conduits. Water spreading is not considered irrigation; it is recorded as a conservation practice. [NRI-97] For more information: <http://www.nrcs.usda.gov/technical/NRI/>
8. 303(d) Stream data. Minnesota's Final Impaired Waters (per Section 303(d) Clean Water Act), 2006. Data obtained from Minnesota Pollution Control Agency (MPCA). The Minnesota Pollution Control Agency (MPCA) helps protect state water by monitoring quality, setting standards and controlling inputs through the development of TMDL plans. <http://www.pca.state.mn.us/water/tmdl/index.html#maps>.

Footnotes / Bibliography (continued)

9. National Coordinated Common Resource Area (CRA) Geographic Database. A Common Resource Area (CRA) map delineation is defined as a geographical area where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a Common Resource Area

10. Soil Survey Geographic Database (SSURGO) Tabular and spatial data obtained from NRCS Soil Data Mart at <http://soildatamart.nrcs.gov>. Publication dates vary by county. Component and layer tables were linked to the spatial data via SDV 5.1 and ARCGIS 9.1 to derive the soil classifications presented in these examples. Highly Erodible Land Classification Data obtained from USDA/NRCS EFOTG Section II, County Soil Data. HEL classifications were appended to SSURGO spatial data via an ARCEdit session. Addendum and publication dates vary by county.

11. Lands removed from production through farm bill programs. County enrollment derived from the following: CRP Acres: www.fsa.usda.gov/crpstorpt/07Approved/r1sumyr/mn.htm (7/30/04). CREP Acres: <http://www.bwsr.state.mn.us/easements/crep/easementssummary.html> (7/31/03). WRP Acres: NRCS (8/16/04). Data were obtained by county and adjusted by percent of HUC in the county.

12. Socioeconomic and Agricultural Census Data were taken from the U.S. Population Census, 2000 and 2002 Agricultural Census and adjusted by percent of HUC in the county or by percent of zip code area in the HUC, depending on the level of data available. Data were also taken from MPCA AFO/CAFO counts provided by county for 2005.

13. 1997 NRI Estimates for sheet and rill erosion (WEQ & USLE). The NRI estimates sheet and rill erosion together using the Universal Soil Loss Equation (USLE). The Revised Universal Soil Loss Equation (RUSLE) was not used in the 1997 NRI. RUSLE was not available for previous inventories, therefore the use of USLE was continued to preserve the trending capacity of the NRI database. Wind erosion is estimated using the Wind Erosion Equation (WEQ). For further information visit <http://www.mn.nrcs.usda.gov/technical/nri/findings/erosion.htm>

14. Federally listed endangered and threatened species counts obtained from NRCS Field Office Technical Guide, Section II, Threatened and Endangered List. <http://www.nrcs.usda.gov/Technical/efotg/>. Where listed, Essential fish habitat as established by Magnuson-Stevens Fishery Conservation and Management Act, Public Law 94-265, as amended through October 11, 1996 <http://www.nmfs.noaa.gov/sfa/magact/>

15. Watershed Projects, Plans, Monitoring. Natural Resources Conservation Service, Watershed Projects Planned and Authorized, <http://www.nrcs.usda.gov/programs/watershed/Purpose>. Additional Information on listed individual projects can be obtained from the noted parties.